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INT CL<sup>5</sup> A01N, A61L  
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(54) **Combustible insect repellent or incense coil**

(57) Insect repellent or incense in coils or other configurations is made substantially of a combustible hydrocarbon material especially amorphous carbon. The amorphous carbon may be charcoal or activated carbon.

Particularly and advantageously, insect repellent or incense coils are made by grinding and mixing charcoal or activated carbon, a binder agent, and water into a paste. The paste is extruded to form a flat sheet. A coil imprint is stamped in turn on said flat sheet. The imprints are either dipped in or sprayed with chemicals-in-alcohol solution. The chemicals include an active ingredient and perfume (in the case of making insect repellent) perfume (in the case of making incense). The treated imprints are air-dried and then packed.

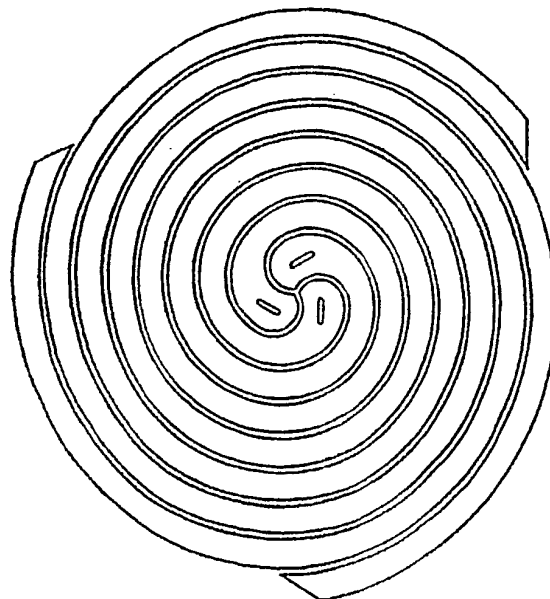


Figure (1a)

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

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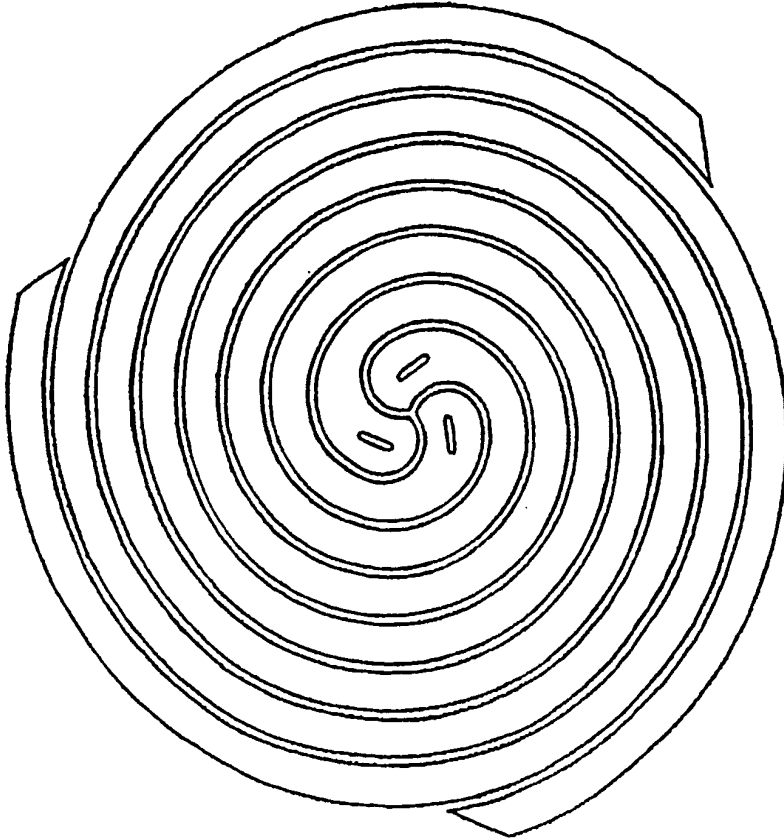


Figure (1a)

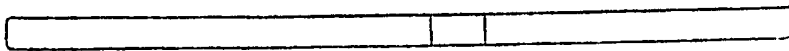


Figure (1b)

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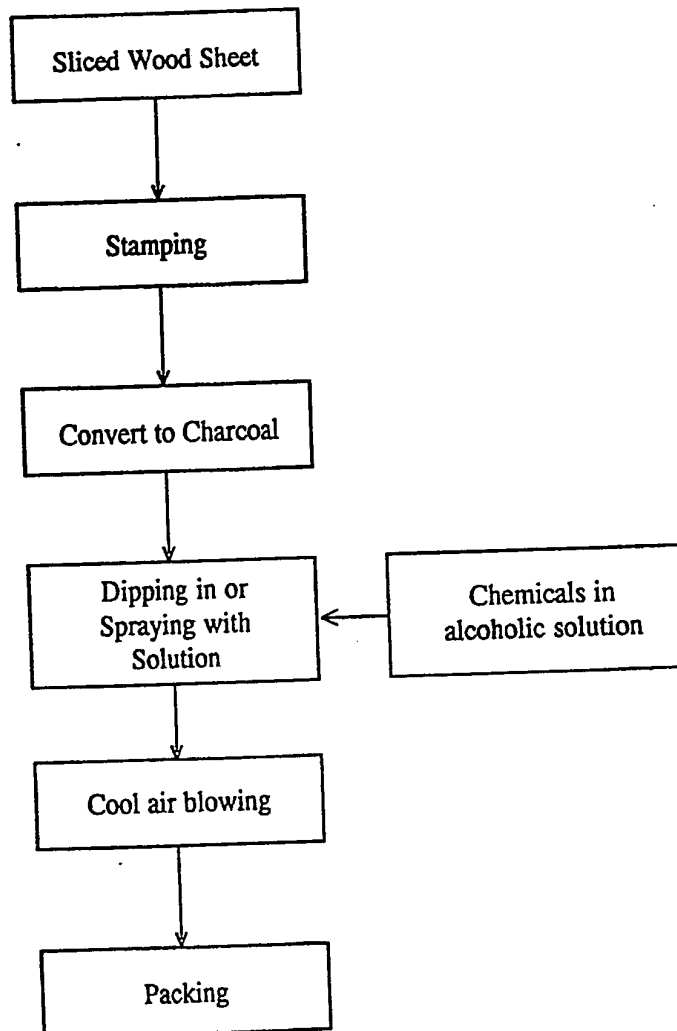


Figure (4)

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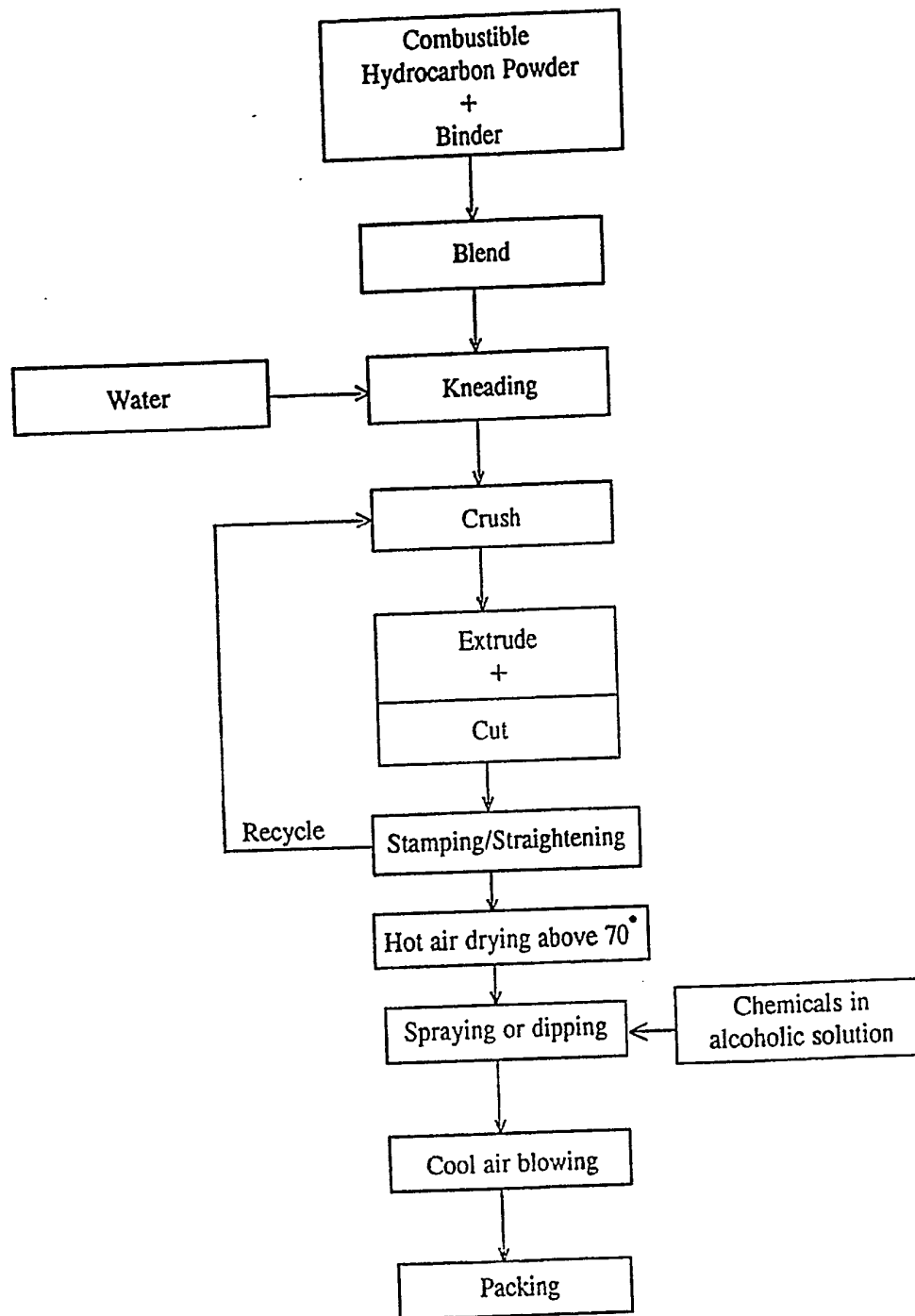


Figure (3)

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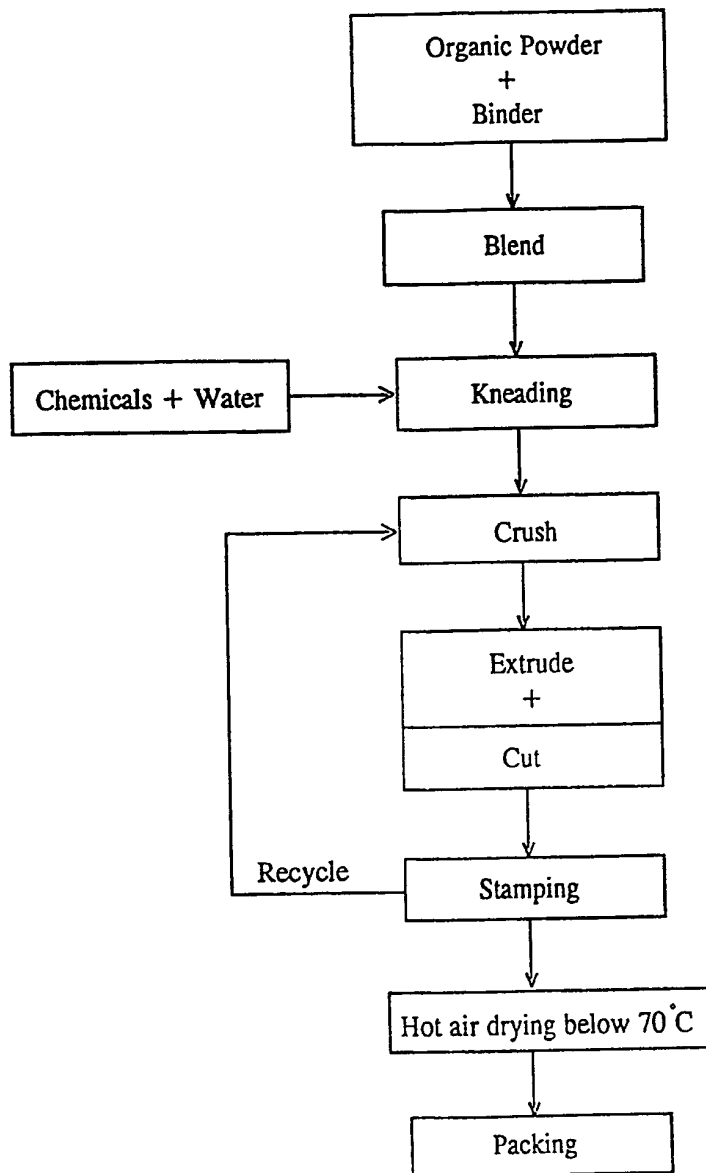


Figure (2)

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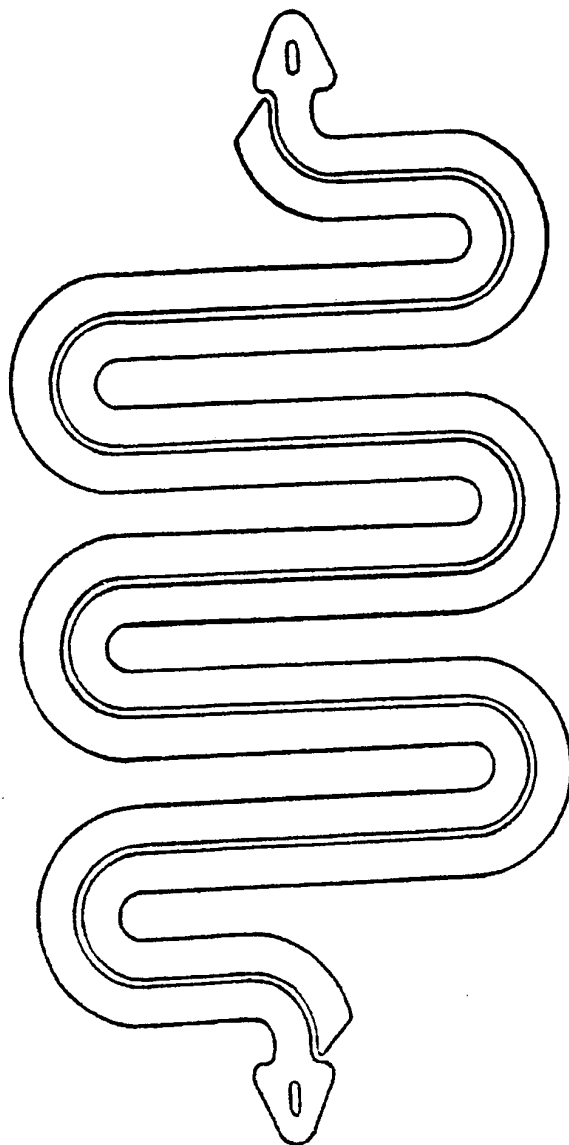


Figure (5)

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INSECT REPELLENT OR INCENSE COIL

Conventional coils are produced according to known processes of blending and mixing, followed by crushing, and then extrusion and cutting into flat sheets. Subsequently, a plurality of double-coil imprints are stamped out  
5 in turn from each flat sheet.

Conventional mosquito coils consist of substantially organic material in powder form blended with binder agents, and chemicals (active ingredients and perfume). A composition of the conventional mosquito coil corresponds  
10 to the components and percentages by weight set forth in Table (1).

Table (1)

	Organic powder	80 %
15	Binder agent	19.7 - 19.9 %
	Chemicals	0.1 - 0.3 %

The organic material includes a combination of wood, coconut shell, flour made from leaves, pyrethrum marc, and  
20 other nutshells. The organic material is preferably

ground to powder form prior to mixing with the binder agent and chemicals also preferably in powder form. The binder agent includes a combination of gum powder and starch. The purpose of adding the binder agent is to  
5 retain the coil shape during use, to reduce the chance of agglomeration and caking, and hence to prolong the burning time of the coil. In the prior art composition, when the content of the binder agent reaches approximately 20% by weight, a burning promotion agent such as potassium  
10 nitrate is added to enhance the burning process. The commonly used active ingredients include preferably d-allethrin, or d-trans-allethrin. The amount of active ingredient is regulated, so that it is not hazardous to health when inhaled. Incense coils or joss sticks include  
15 the composition of the organic powder, the binder agent and perfume without the active ingredient as chemicals.

Conventional coils are breakable and, consequently, the burning time of the coil is interrupted. The burning time of a whole coil is designed for a predetermined duration,  
20 preferably of eight to ten hours. To maximise use of material, a double-coil imprint is stamped in turn on each sheet. Five double-coil imprints are contained in a consumer pack.



Owing to their organic material content, conventional coils emit substantive amounts of fumes and smoke, particularly disagreeable and unpleasant to some consumers. The fumes and smoke further stain the surrounding walls after  
5 a period of use. The perfume used in conventional coils is made ineffective by the fume and smoke generated.

Since organic matter is included in the prior art composition, a preservative agent such as sodium benzoate is added to prevent mould formation on the incense or insect repellent coils when they are stored in damp places for  
10 long periods of time before use.

It is thus an object of the present invention to improve the composition of insect repellent or incense in coils or other configurations made substantially from amorphous  
15 carbon in powder form such as charcoal or activated carbon.

It is another object of the invention to improve the  
20 method for producing insect repellent or incense in coils or other configurations for long-term storage without deleterious consequences on the rigidity of their shape.

Still another object of the invention is to provide an insect repellent or incense in coils or other configurations that is smokeless when burned.

5 A further object of the invention is that the repellent or incense can be kept for a longer period without mould formation even though no preservative is included in the composition.

These objects and other aspects of the invention will be described in detail in the specification set forth below.

10 The present invention relates to a composition for an insect repellent or incense, in coils or other configurations, comprising substantially a hydrocarbon combustible material, a binder agent, active ingredients and/or perfume.

15 A preferred composition for insect repellent, or incense in coils or other configurations comprises substantially a combustible hydrocarbon material and chemicals, wherein the hydrocarbon material consists substantially of amorphous carbon such as charcoal or activated carbon.

20 The present invention also relates to a process for manufacturing insect repellent or incense coils, from the above-mentioned composition, which includes firstly grinding combustible hydrocarbon material into dry powder  
25 form and secondly blending and kneading the combustible material in predetermined ratios to form a paste. The paste is extruded. In the case of coil form, triple-coil imprints are stamped out in turn from flat sheets.

The imprints are then treated with active ingredients and perfume before being dried and packed. The treatment can be either by dipping or spraying means.

5 The present invention further relates to an alternative method of producing insect repellent or incense in coils or other predetermined configurations which include first-ly selecting and configuring a suitable combustible hydro-carbon material, and secondly converting it into charcoal. The charcoal coils or other configurations are either  
10 dipped into a solution of active ingredient and perfume or sprayed with said solution, and then dried and packed.

Exemplary embodiments of the invention will now be described, with reference to the following drawings:

15 Figures (1a) & (1b) show respectively a plan view and an elevation view of coils in a triple-coil imprint impressed from a stamping process.

Figure (2) is a prior art process flow diagram of making  
20 mosquito coils.

Figure (3) is an improved process flow diagram illustrating the steps involved in the manufacturing of insect repellent or incense preferably in accordance with  
25 the composition of the present invention.

Figure (4) is yet another improved process flow diagram illustrating the steps involved in the method of manufacturing insect repellent or incense preferably in accordance with the present invention.

- 5 Figure (5) is a zig-zag hanging coil made from diced wood sheet.

The present invention has been described with respect to certain embodiments and conditions, which are not meant to  
10 and should not be construed to limit the invention. Those skilled in the art will understand that variations may be made without departing from the invention as claimed.

In order for each coil to burn for a period of eight to ten hours, the spiral length of each coil in the prior art  
15 is typically 75 cm. This then limits the number of the coils to be stamped and packed. The double-coil imprints are usually required by national standards not to be unduly brittle, so as to allow separation without breaking. The double-coil imprint is to remain intact when  
20 dropped from a height with the plane of the coil horizontal to a smooth solid surface.

The process and the composition of the insect repellent are now described. Unlike the prior art composition, an exemplary composition according to the invention is characterised by components and quantities by weight percentages as set forth in Table (2).

Table (2)

Amorphous carbon	80 %
Binder agent	19.4 - 19.8 %
Active Ingredient	0.1 - 0.3 %
10 Perfume	0.1 - 0.3 %

The purpose of using amorphous carbon is to reduce fume and smoke generation, and to shorten the subsequent drying time. One example of the amorphous carbon is charcoal powder with a carbon content of more than 70%, a pH value of around 6.7, and a moisture content of 8 to 10%. When coils made from the disclosed composition are burned, there is substantially no fume and no smoke. This also means that the surrounding walls and ceilings are not stained. In this case, the scent of perfume is not suppressed. In the prior art manufacturing process, the drying time is observed to be approximately twelve hours whereas in the improved manufacturing process, the drying time is reduced to four hours. It is to be noted

that the use of malachite green and sodium benzoate has been avoided. In the prior art, the use of binder agent is limited to approximately 20% by weight content. When more than 20% binder agent is to be used, a burning promotion agent such as potassium nitrate is to be included to  
5 prolong the burning time. In the present invention, more than 25% binder agent has been used in trial experiments lasting twelve hours burning time.

It is also important to note that owing to the above  
10 characteristics, the spiral length of each coil can be reduced to 56.5 cm. This means that triple-coil imprints, instead of double-coil imprints, can be impressed with each stamping mould in turn. The triple-coil imprint is illustrated in Figures (1a) and (1b).

15 Referring to Figure (2), when making mosquito coils, the active ingredients and perfume as chemicals are mixed homogeneously by a kneading process before subsequent processes of crushing and extrusion. Because of this, approximately 40 to 60 % of the chemicals is allowed to be  
20 released when the coil is burned. The rest will be destroyed by the heat generated by the burning end of the coil. The temperature of the burning segment can reach

about 700 degrees C. When making incense coils, only perfume as chemical is mixed.

The coil imprints stamped from the extruded flat sheets are then dried by hot air blowing at a temperature below  
5 70 degrees C.

Now referring to Figure (3), amorphous carbon preferably activated carbon or charcoal waste and binder agent such as gum powder or joss powder or alpha starch are blended in a dry vessel. The mixture is then transferred into a  
10 second vessel where water is added. The resulting paste is later transferred to a crushing unit. The paste is extruded into flat sheets which are cut and fed to a stamping machine which is mounted with a plurality of moulds. The mould according to the present invention  
15 preferably carries a design for a triple-coil imprint.

An alternative forming process instead of coil stamping is a straightening process as in the case of making joss with or without sticks.

The triple-coil imprints stamped out are first dried by  
20 hot air at a temperature above 70 degrees C and then either dipped in, or sprayed with, a chemicals-in-alcohol solution. In the case of insect repellent coils, the

chemicals comprise substantially the active ingredients and perfume. In the case of incense coils, the chemicals comprise substantially the perfume.

5 The treated imprints are transferred to carriers preferably plastic trays. The unused flat sheets can be recycled in the crushing unit. The treated imprints are dried in an oven or an air-blowing tunnel for a predetermined period. After drying, the imprints are packed.

10 Two advantageous variations are to spray the chemical solution onto the configurations or coils, or to dip the configurations or coils in the solution. In the case of insect repellent, the active ingredient impregnates the combustible hydrocarbon substrate and is held by the binder agent. Because of this, some of the active ingredient is destroyed by heat when the substrate burns.  
15 Spraying the chemical solution allows the active ingredient to be released more efficiently. It is to be noted that the chemical solution need not be added immediately after the blending step. It is advantageously sprayed  
20 onto dried coil or other configuration imprints made according to the disclosed method. The imprints are then air-dried again before packing.



Referring to Figure (4), hardwood preferably in flat sheet form is used. Each flat sheet can be impressed with a plurality of moulds bearing different designs, which includes a triple-coil design. After stamping, the  
5 imprints are heated in an oven with a restricted air supply and converted to charcoal. The charcoal imprints are either dipped in a chemical solution or sprayed with said solution. The chemical solution includes the active ingredient and perfume as in the above mentioned process  
10 of making insect repellent. The chemical solution includes the perfume as in the case of incense. The imprints are then dried and eventually packed.

Figure (5) shows a configuration of zig-zag imprints used preferably in this improved process.

Claims

1. A combustible substance for use as an insect repellent or incense containing amorphous carbon.
- 5 2. A substance according to claim 1, wherein the amorphous carbon is in the form of charcoal or activated carbon.
3. A substance according to claims 1 or 2, containing 80% by weight of amorphous carbon.
- 10 4. A substance according to any preceding claim further containing a binder agent and an active ingredient.
- 15 5. A substance according to any preceding claim having the following composition by weight
- |                      |              |
|----------------------|--------------|
| Amorphous Carbon     | 80%          |
| Binder Agent         | 19.4 - 19.8% |
| 20 Active ingredient | 0.1 - 0.3%   |
| Perfume              | 0.1 - 0.3%   |
6. A substance according to any of claims 1 to 4 containing more than 25% by weight of binder agent.
- 25 7. A combustible substance for use as an insect repellent or incense substantially as herein described.
8. An insect repellent or incense coil made from a substance according to any preceding claim.
- 30

9. A process of producing insect repellent or incense coils comprising the steps of, blending and kneading a combustible hydrocarbon material substantially comprising amorphous carbon, a binder agent, and water to form a  
5 paste; extruding said paste to form a flat sheet; stamping one or more coils from each flat sheet; drying the coils with hot air; treating the coils with a chemical solution; and air-drying and thereafter packing the treated coils.

10 10. A process according to claim 9, wherein the amorphous carbon is in the form of charcoal or activated carbon.

11. A process of producing imprints comprising the  
15 steps of: selecting and slicing porous wood material to form flat sheets of predetermined thickness; converting said flat sheets into charcoal by heating slowly in an oven with a restricted air supply; stamping imprints of predetermined configuration from said flat sheets; drying  
20 the imprints with hot air; treating said imprints with a chemical solution; and air-drying and packing said imprints.

12. A process according to claim 11, wherein the  
25 porous wood material is made from hardboard.

13. A process of producing imprints whether in coils or other configurations, as in any of claims 9 to 12, wherein the treatment for each imprint includes the step  
30 of dipping it in a chemical solution of active ingredient and perfume when making insect repellent.

14. A process of producing imprints whether in coils or other configurations, as in any of claims 9 or 12,

wherein the treatment for each imprint includes the step of dipping it in a chemical solution of perfume when making incense.

5 15. A process of producing imprints whether in coils or other configurations, as in any of Claims 9 or 12, wherein the treatment for each imprint includes the step of spraying it with a chemical solution of active ingredient and perfume when making insect repellent.

10 16. A process of producing imprints whether in coils or other configurations, as in any of Claims 9 or 12, wherein the treatment for each imprint includes the step of spraying it with a chemical solution of perfume when  
15 making incense.

17. A process of producing imprints in coils according to any of Claims 9 to 16 in which a design of three coils is stamped on said flat sheet, wherein the head of each  
20 coil is situated near a common centre while the tails of the three coils are spaced equidistantly on the circumference, the spiral length of each coil being predetermined to last a specified burning time.

25 18. A process according to claim 17, wherein the spiral length of each coil is 56.5 cm.

19. A process according to claims 17 or 18, wherein each coil burns for more than eight hours.

30 20. A process of producing imprints substantially as herein described with reference to Figures 2 to 4 of the accompanying drawings.

21. An insect repellent or incense distributing device having a substantially flat, circular form and comprising three coils of a combustible insect repellent, wherein the head of each coil is situated near the centre of the device and the centre of the device and the tails of the coils are spaced equidistantly on the circumference of the device.

22. An insect repellent or incense distributing device comprising a sinuous strip of combustible insect repellent of incense, the strip comprising a plurality of laminated lengths of insect repellent or incense.

23. An insect repellent or incense distributing device substantially as herein described with reference to either Figures 1(a) and 1(b) or Figure 5 of the accompanying drawings.

Patents Act 1977  
Examiner's report to the Comptroller under  
Section 17 (The Search Report)

Application number

92 9225598.3

Relevant Technical fields

- (i) UK Cl (Edition L ) A5E (ECC)
- (ii) Int Cl (Edition 5 ) A01N, A61L

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Search Examiner

S J QUICK

Date of Search

21 JANUARY 1993

Documents considered relevant following a search in respect of claims 1-20 & (INPART) 21-23

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	Derwent Publications Ltd's World Patents Index (Online), title with WPI Accession Numbers 90 171708/23 and CN 1033920	1-23
X	Derwent Publications Ltd's World Patents Index (Online), title with WPI Accession Numbers 89 213475/30 and CN 86108958	1-23
X	Derwent Publications Ltd's World Patents Index (Online), abstract with WPI Accession Numbers 67 01625H/00 and JP 68003919 B (1968)	1-23

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Category	Identity of document and relevant passages - 17 -	Relevant to claim(s)

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